

ABSTRACT

Methods and powder blends are provided for fabricating a metal part. One method includes the first steps of spreading a layer of a powder blend on a platform, the powder blend including a titanium base metal or alloy, and an alloying metal having a lower melting temperature than that of the base metal or alloy. Next, an energy beam is directed onto selected areas of the powder blend layer to thereby melt the alloying metal. Then, the alloying metal is re-solidified by withdrawing the energy beam from the powder blend layer. Then, a preform part is built up by iteratively performing the spreading, melting, and re-solidifying steps on additional adjacently formed layers. A metal liquid phase sintering process is performed at a temperature sufficient to melt the alloying metal but not the base metal or alloy.